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(54) Juncture assembly between assemblable elements of a support frame, in particular of a crane.

(57) In a juncture assembly between assemblable elements of a support frame, two juncture elements connect two respective lined-up portions of two adjacent assemblable elements of the support frame; the two juncture elements are connected by means of two respective heads, fastened to each other by two mutually half-shells fastened to each other; the two heads are provided, along a transversal symmetry axis, with two respective grooves, which form a seat housing a fastening bolt, which fastens the two half-shells to each other; thus, a reliable, easily assemblable, juncture assembly is provided, which is endowed with low production and storage costs.

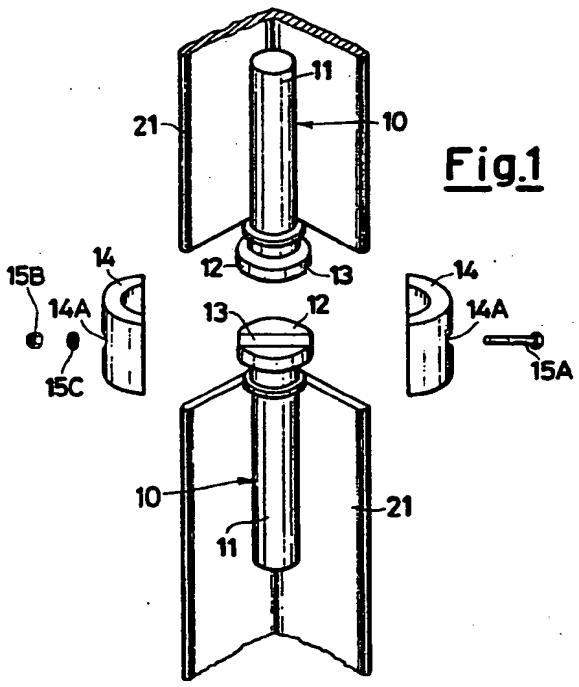

Fig.1

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"JUNCTURE ASSEMBLY BETWEEN ASSEMBLABLE ELEMENTS OF A SUPPORT FRAME, IN PARTICULAR OF A CRANE"

The present invention relates to a juncture assemly between assemblable elements of a support frame, in particular of a crane.

It is known that the tower cranes are composed, in the vertical-axis portion of their structure, by a set of tower elements assembled on each other.

Such tower elements are rigidly connected with one another by using several juncture systems.

As a matter of fact, these juncture systems connect lined-up uprights of the tower elements.

According to one of the proposed juncture systems, to the purpose of connecting each couple of adjacent uprights, a joint is provided, which comprises a first juncture element integral with one of the two uprights, and a second juncture element, integral with the other one of the two uprights; the two juncture elements are provided with respective heads mating in a male-female fashion; these heads are fastened to each other in such a mating position by means of two half-shells, which close over said heads, forming a sleeve, and which are tightened to each other by means of four screws, which are screwed down in the half-shells along parallel, symmetrically distributed axes close to axes tangent to the half-shells.

This solution shows drawbacks.

First of all, if loads applied to the tower crane generate on each joint stresses tending to shift the longitudinal axes of the two heads from a position of coincidence to a position of mutual inclination, the tigthening screws which fasten the two half-shells to each other result to be very stressed; that may even result in the breakage of the screws, with easily imaginable consequences.

With such juncture system, furthermore, the assembling of the tower crane results extremely long and laborious, in as much as the operator must screw down and tighten four screws for each couple of consecutive uprights, and it is well-known that the couples of uprights to be connected are many in a tower crane.

It should be added that the male-female coupling presupposes a different shape of the two heads of the two juncture elements, and hence a different and expensive production processing for each of them; this is true for the half-shells too, in that one of them must receive only the shank of the screws, whilst the other one must receive, besides the shank, also the head of the screws. This fact causes high production and storage costs for the manufacturer of the tower crane.

The purpose of the present invention is to obviate the above-said drawbacks.

Such a purpose is achieved by means of a juncture assembly between assemblable elements of a support frame, wherein two juncture elements are provided, which are integral with two respective lined-up portions of two consecutive assemblable elements of the support frame, said two juncture elements comprising two respective heads joined with and fastened to each other by means of two mutually tightened half-shells, characterized in that each head is provided with a groove positioned along a trasversal axis of symmetry of the head, the two grooves being coincident with each other, so to form a seat inside which the body of a fastening element, which locks the two half-shells to each other, is housed.

Hereunder, an exemplifying form of practical embodiment of the present invention is disclosed, which is not limitative of the same invention, as illustrated in the hereto attached drawing tables, wherein:

Figure 1 shows a perspective exploded view of a juncture assembly according to the invention;

Figure 2 shows, in longitudinal section, a partial view of the assembly of Figure 1, in its assembled configuration;

Figure 3 shows a perspective view of a plurality of juncture assemblies, identical to that of Figure 1, applied to a tower crane.

The juncture assembly shown in Figures 1, 2 is particularly, but not exclusively, destined to connect the tower element of a tower crane, shown in Figure 3.

It is provided with two identical juncture elements, indicated by the reference numeral 10, each of which comprises a cylindrical stem, and a head having a circular shape which is radiused with the stem, respectively indicated by the reference numerals 11 and 12.

The stem 11 of one of the two juncture elements 10 is fastened, e.g. by welding, to an upright, having an"L"-shaped outline, indicated by the reference numeral 21, of a tower element 20 of the tower crane, and the stem 11 of the other juncture element 10 is equally fastened to an identical upright 21 of another tower element 20 consecutive to the preceding one, and lined up with it.

In each head 12 a semi-cylindrical groove 13 is formed along a diametrical, i.e., trasversal, axis of symmetry of the head.

Furthermore, two identical half-shells 14 are provided; each of them has a generally semi-cylindrical shape, with a substantially "C"-shaped cross section (Figure 2), destined to enclose the two heads 12.

For assembling such a juncture assembly, the two tower elements 20 are superimposed to each other, so that the two heads 12 come to superimpose to, and to perfectly mate, with each other, forming, with the two grooves 13, a cylindrical seat. Now, the two half-shells 14 are assembled, so to enclose the two heads 12, locking them to each other, thanks to their "C"-shaped cross-section, forming a sleeve, and are tightly fastened to each other by means of a bolt 15. The stem of the screw 15A of the bolt 15 runs through a bore 14A provided on a half-shell 14, the above-said cylindrical seat, and the bore 14A of the other half-shell 14. The nut 15B of the bolt 15 comes to press, with the interposition of a washer 15C, against one of the two half-shells 14, in contrast with the action of the head of the screw 15A, which presses against the other half-shell 14, along a transversal axis of symmetry of the two half-shells.

In Figure 3, two consecutive tower elements 20 of the tower crane are partially shown. For their mutual rigid connection, four juncture assemblies, like the juncture assembly hereinabove disclosed, are necessary, in that four couples of consecutive uprights 21 are provided.

Such a juncture system brilliantly obviates the drawbacks seen in the introduction.

First of all, the position of the fastening bolt which mutually tightens the two half-shells along a diametrical axis of symmetry of the heads of the juncture elements involves low stresses of the same tightening bolt when the crane is charged with a load. In particular, such stresses result to be much lower than the stresses which are applied to the fastening screws of the juncture system of the prior art, discussed in the introduction; in fact, the above-said axis of symmetry shows to be the locus undergoing the minimum stress relatively to the axes, close to axes tangent to the half-shells, along which the above-said fastening screws are positioned.

Secondly, for each couple of uprights, the operator must tighten one bolt only, and in this way the crane assembling time results to be considerably reduced relatively to the assembling time required by the juncture system described in the introduction.

Thirdly, the fact that the two juncture elements, as well as the two half-shells, are identical to each other, allows avoiding differentiated processing routes, with consequent reductions in production and storage costs.

In the herein illustrated example, wherein the uprights 21 have an "L"-shaped outline, the stem 11 of each juncture element 10 is fastened in correspondence with the axis of intersection of the two flanges of the upright, this position resulting to be the best one from all viewpoints.

Also uprights having a different outline can be provided, e.g., "U"-shaped uprights, or tubular uprights, with which the stem of each juncture element is made integral.

Clearly, variants having different shapes of both the stem and the head of the juncture element, and shape variants of the two half-shells can be provided. Also the groove provided in the head can have different shapes.

Obviously, the herein disclosed and illustrated juncture assembly can be applied to cranes in general, and, in a more general meaning, to any support frames made up of assemblable elements. The assemblable elements can be positioned, besides vertically, as in the herein exemplifying form of practical embodiment, also horizontally and obliquely, and in these cases, instead of the uprights, other lined-up portions of the assemblable elements shall be concerned.

Claims

1. Juncture assembly between elements of a support frame, wherein two juncture elements are provided, which are integral with two respective lined-up portions of two consecutive assemblable elements of the support frame, said two juncture elements comprising two respective heads joined with, and fastened to, each other by means of two mutually tightened half-shells, characterized in that each head is provided with a groove positioned along a trasversal axis of symmetry of the head, the two grooves being coincident with each other, so to form a seat inside which the body of a fastening element, which locks the two half-shells to each other, is housed.

2. Juncture assembly according to claim 1, wherein said fastening element is positioned along a transversal axis of symmetry of the two half-shells.

3. Juncture assembly according to claim 1 or 2, wherein said fastening element is constituted by a bolt comprising a screw and a nut, the head of the screw and the nut performing opposite tightening actions on respectively the one and the other of the two half-shells, the shank of the screw constituting said body.

4. Juncture assembly according to claim 3, wherein each groove has a semicylindrical shape, so to form, with the other groove, a cylindrical seat inside which the shank of said screw is housed.

5. Juncture assembly according to claim 1, wherein each half-shell has a substantially "C"-shaped section.

6. Juncture assembly according to claim 1 or 5, wherein each head has a circular shape, and each half-shell has a substantially semicylindrical shape.

7. Juncture assembly according to claim 1, wherein each juncture element comprises a stem which is radiused with the head.

8. Juncture assembly according to claim 7, wherein said stem is ridigly fastened to a respective one of the above-said two lined-up portions of the assemblable elements.

9. Juncture assembly according to claim 7 or 8, wherein said stem has a cylindrical shape.

10. Juncture assembly according to claim 1, wherein each of said lined-up portions of the two assemblable elements has an "L"-shaped outline, and the respective juncture element is fastened in correspondence of the line of intersection of the two flanges of the outline.

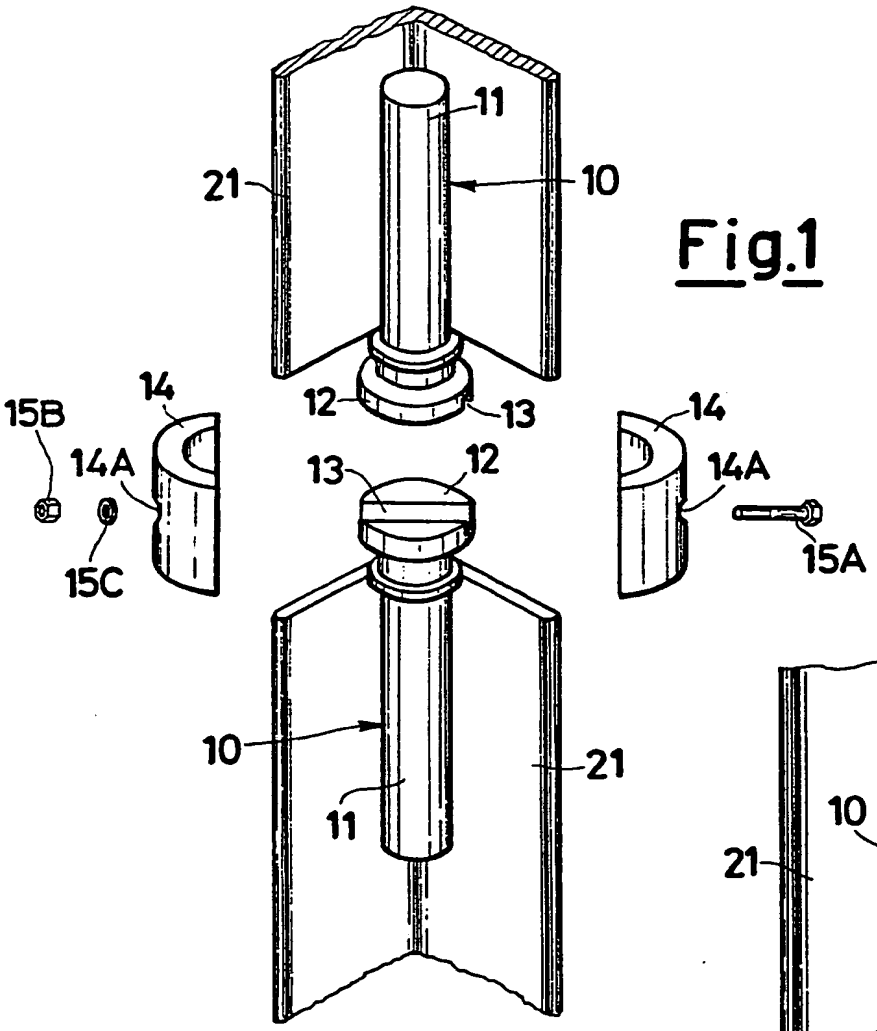


Fig.1

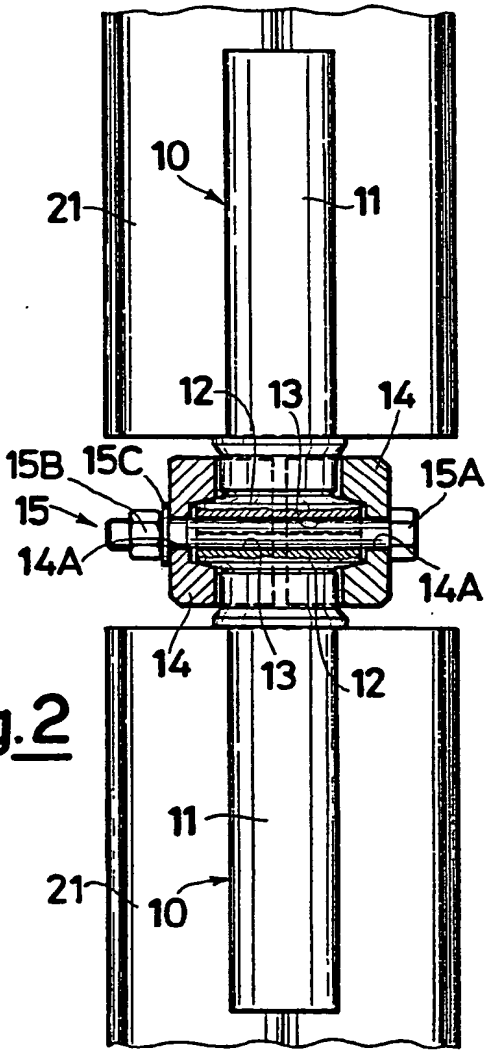
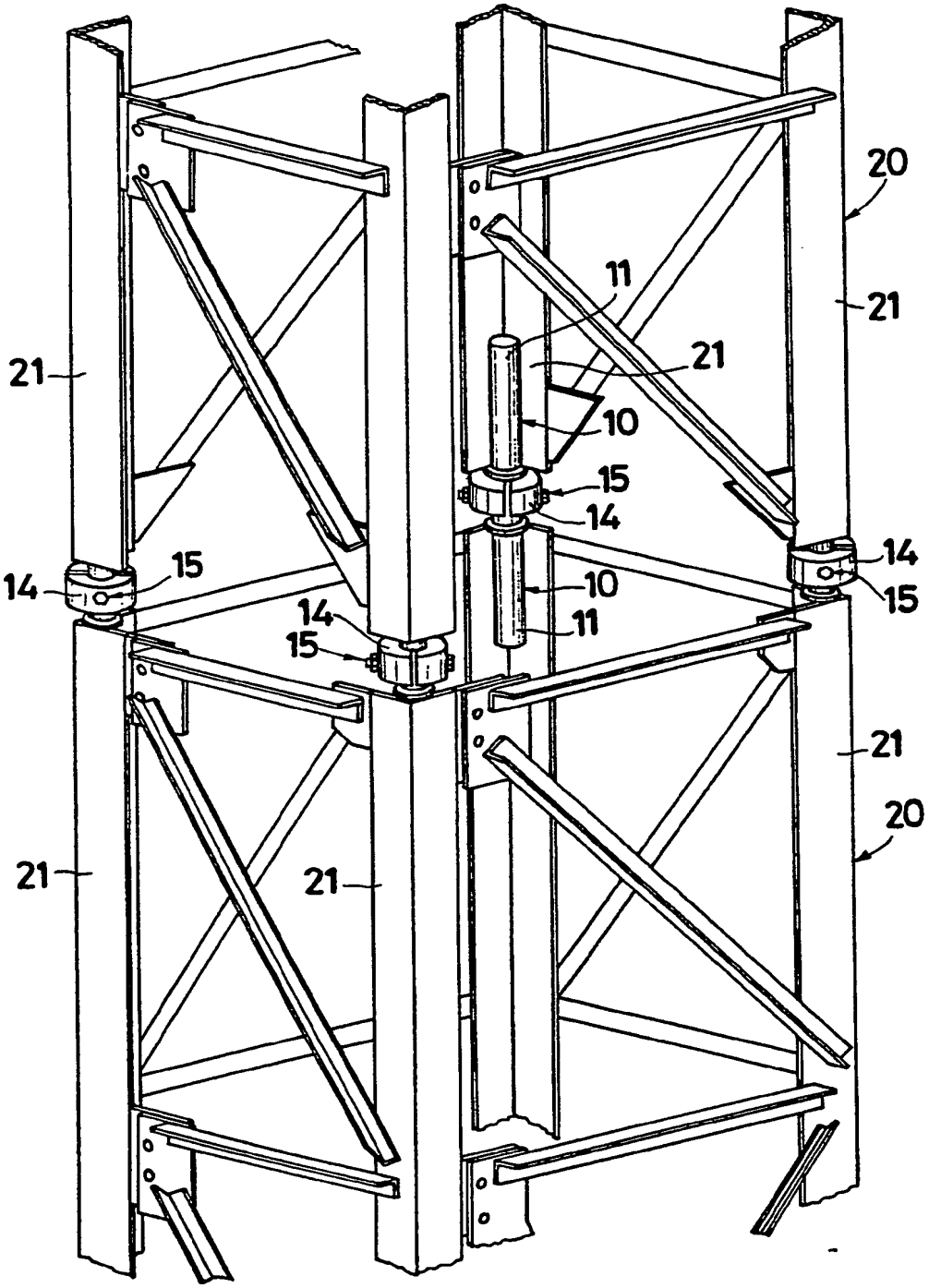


Fig.2

Fig.3



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EUROPEAN SEARCH REPORT

Application Number

EP 87 20 1810

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	FR-A-1 588 135 (MASCHINENFABRIK OTTO KAISER) * Page 2, lines 7-35 *	1-4,7,8,9	B 66 C 23/28 F 16 B 7/04 E 04 H 12/10
A		6	
Y	US-A-1 806 312 (SCHILLER) * Page 1, lines 78-89; page 2, lines 20-31 *	1-4,7,8,9	
A	CH-A- 660 060 (D. ECUYER) * Whole document *	5,6	
A	GB-A- 403 052 (BLAKEBOROUGH)		
A	US-A-1 806 687 (HOOVER)		
A	US-A-1 836 865 (NORMAN)		
A	GB-A-2 119 891 (TARGETTI SANKEY SpA)		
A	US-A-3 521 917 (KING)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 66 C
E 04 H
F 16 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22-08-1988	VAN DEN BERGHE E.J.J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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